

Appl. No. : 10/824,798
Filed : April 15, 2004

AMENDMENTS TO THE CLAIMS

Please amend the Claim Form and Claim as follows. Insertions are shown underlined while deletions are ~~struck through~~.

1 (currently amended): A gas-feeding apparatus configured to be connected to an evacuable reaction chamber provided with a support for placing a substrate thereon, comprising:

a gas-distribution head for introducing gases into the chamber through a head surface, comprising:

a first plate having exclusively a first section-flow channel for discharging a first gas therein through the first flow channel and the head surface toward the support; and

a second plate constituting the head surface and disposed under the first plate, said second plate having both the first flow channel and a second section-flow channel which is for discharging a second gas therein through the second flow channel and the head surface toward the support, wherein there is no gas-mixing between the first flow channel and the second flow channel,

~~said first and said second sections being isolated from each other with respect to gas mixing in the gas distribution head, at least one of which section-flow channels is coupled to an exhaust system for purging therefrom a gas present in the corresponding section-flow channel~~ without passing through the head surface,

~~said first and second sections/plates being each stratified parallel to the head surface~~each other in a direction perpendicular to their axial direction and being overlapped as viewed in the axial direction, said second section/plate being closer to the head surface than is the first section/plate.

2 (currently amended): The gas-feeding apparatus according to Claim 1, wherein at least the first section-flow channel is coupled to the exhaust system for purging a gas present in the first flow channel without passing through the head surface.

3 (currently amended): The gas-feeding apparatus according to Claim 1, wherein the second section-flow channel is coupled to the exhaust system for purging a gas present in the second flow channel without passing through the head surface.

4 (currently amended): The gas-feeding apparatus according to Claim 1, wherein the first ~~section-flow channel~~ and the second ~~section-flow channel~~ are both respectively coupled to exhaust systems, ~~respectively for purging a gas present in the corresponding flow channel without passing through the head surface.~~

5 (currently amended): The gas-feeding apparatus according to Claim 2, wherein the first ~~section-flow channel~~ has a volume which is larger than that of the second ~~section-flow channel~~.

6 (currently amended): The gas-feeding apparatus according to Claim 2, wherein the gas ~~from the first section-flow channel reaches the head surface through and the second section-flow channel are overlapped as viewed in the axial direction without being communicated with each other with respect to gas mixing.~~

7 (currently amended): The gas-feeding apparatus according to Claim 6, wherein the first ~~section-flow channel~~ and the second ~~section-flow channel~~ are gas-separately communicated with the head surface through a plurality of bores, respectively, wherein there is an overlapping area on the head surface where the first flow channel and the second flow channel are overlapped as viewed in the axial direction and both the bores of the first flow channel and the bores of the second flow channel are provided.

8 (currently amended): The gas-feeding apparatus according to Claim 2, wherein the first ~~section-flow channel~~ comprises a central distribution inlet and a cone-shaped distribution plate extending radially therefrom.

9 (currently amended): The gas-feeding apparatus according to Claim 4, wherein the first ~~section-plate~~ has bores communicating the first flow channel, and the second ~~section-plate~~ are each disposed parallel to the head surface and each has separately communicated with the head surface through bores communicating the first flow channel and bores communicating the second flow channel, said second section being closer to the head surface than is the first section.

10 (currently amended): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the second ~~section-flow channel~~ and the head surface are disposed predominantly in a central area of the head surface, whereas the bores communicating the first section and the head surface are uniformly distributed on the head surface including the central area.

11 (previously presented): The gas-feeding apparatus according to Claim 10, wherein the second section has a prolonged shape in the gas-distribution head.

12 (currently amended): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the first ~~section-flow channel~~ and the head surface have a total opening area on the head surface which is larger than that of the bores communicating the second ~~section-flow channel~~ and the head surface.

13 (currently amended): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the first ~~section-flow channel~~ and the head surface have an average bore size which is larger than that of the bores communicating the second ~~section-flow channel~~ and the head surface.

14 (currently amended): The gas-feeding apparatus according to Claim 2, further comprising an RF power source for exerting RF power exclusively onto an interior of the second ~~section-flow channel~~.

15 (currently amended): The gas-feeding apparatus according to Claim 14, wherein the RF power source is coupled to a ~~bottom plate of the first section-plate~~ which physically separates and insulates the first ~~section-flow channel~~ from the second ~~section-flow channel~~, and the head surface is grounded.

16 (previously presented): The gas-feeding apparatus according to Claim 1, further comprising an RF power source coupled to the gas-distribution head to exert RF power onto an interior of the reaction chamber.

17 (currently amended): The gas-feeding apparatus according to Claim 2, wherein the first ~~section-flow channel~~ is coupled to a source gas line and a purge gas line, and the second ~~section-flow channel~~ is coupled to an additive gas line and a purge gas line.

18 (previously presented): The gas-feeding apparatus according to Claim 1, which is connected to an evacuable reaction chamber provided with a support for placing a substrate thereon.

19 (previously presented): The gas-feeding apparatus according to Claim 18, wherein a space between the head surface and the support is coupled to an exhaust system.

20 (previously presented): The gas-feeding apparatus according to Claim 19, wherein the exhaust system for purging therefrom a gas present in the first or second ~~section-flow channels~~

and the exhaust system for evacuating the space between the head surface and the support are connected and merged to a single exhaust line.

21-29 (canceled)

30 (currently amended): A gas-feeding apparatus adapted to be connected to an evacuable reaction chamber for atomic layer growth processing, comprising:

a distribution plate;

a first plate having exclusively first bores through which a first gas passes, wherein a first section is formed between the distribution plate and the first plate, wherein the first gas is introduced into the first section and passes through the first bores; and

a second plate having second bores through which a second gas passes, wherein a second section is formed between the first plate and the second plate, wherein the second gas is introduced into the second section and passes through the second bores,

said second plate further having third bores through which the first gas passes, wherein there is no gas communication between the third bores and the second bores, but there is gas communication between the third bores and the first bores~~connectors are provided in the second section to connect the respective first bores and the respective third bores through the second section without being gas communicated with the second section,~~

wherein the second plate is disposed above the support, the first plate is disposed above the second plate, and the distribution plate is disposed above the first plate,

the first plate and the second plate are overlapped as viewed in their axial direction where the second plate has both the second bores and the third bores and the first plate has the first bores only, and

at least one of the first section or the second section is coupled to an exhaust system which discharges the gas in the corresponding section without passing through the corresponding bores.

31 (original): The gas-feeding apparatus according to Claim 30, wherein the first plate and the second plate are disposed parallel to each other, and the distribution plate has a cone shape.

32 (original): The gas-feeding apparatus according to Claim 30, wherein the distribution plate is provided with a first gas inlet disposed in a central area of the distribution plate for introducing the first gas into the first section.

33 (original): The gas-feeding apparatus according to Claim 30, wherein the second section is provided with a second gas inlet disposed in the vicinity of an outer periphery of the second section.

34 (original): The gas-feeding apparatus according to Claim 30, wherein the first section is coupled to the exhaust system, wherein the first gas present in the first section is exhausted around an outer periphery of the distribution plate.

35 (original): The gas-feeding apparatus according to Claim 30, wherein the second section is coupled to the exhaust system, wherein the second gas present in the second section is exhausted through a second gas outlet disposed in the vicinity of an outer periphery of the second section.

36 (original): The gas-feeding apparatus according to Claim 30, wherein the second bores are disposed predominantly in a central area of the second plate.

37 (original): The gas-feeding apparatus according to Claim 30, wherein the first bores are distributed uniformly on the first plate, and the third bores are disposed right under the respective first bores.

38 (original): The gas-feeding apparatus according to Claim 30, wherein the third bores have a total opening area which is larger than that of the second bores.

39 (original): The gas-feeding apparatus according to Claim 30, wherein the third bores have an average bore size which is larger than that of the second bores.

40 (previously presented): The gas-feeding apparatus according to Claim 36, wherein the second section is coupled to the exhaust system and is provided with a second gas inlet and a second gas outlet near an outer periphery of the second section, wherein the second section has a prolonged shape from the inlet to the outlet via the central area having the second bores.